



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

FIFTY YEARS OF ANTHROPOLOGY

BY PROFESSOR ERNST HAECKEL

A FOREWORD

The recent International Medical Congress in London, with its anthropological discussions, gives an added interest to the following brief paper by Professor Ernst Haeckel. In this pithy article the famous German scientist once more gives us a simple restatement of his scientific principles and of those philosophical doctrines which he has logically evolved from them. The man who has peered so deeply into the cryptic past and so far into the prophetic future, here recounts to us something of the beginnings of the great struggle for the theory of evolution—already so remote!—yet little more than half a century old. Once more he repeats to us the pregnant facts and details which are ever in danger of being obscured, misrepresented, or forgotten.

Every year new discoveries are made that confirm the fundamental accuracy of Haeckel's deductions. Here and there, to be sure, as is inevitable with all sciences, some stone must be discarded or some timber replaced, but the superb structure of scientific research and discovery which mankind owes to Haeckel remains as firmly established as ever. It will always be one of the noblest monuments of civilization, built up by the enormous, love-inspired labor, the holy passion for truth, and the untiring zeal for knowledge of this great hierarch of science.

In anticipation of that brighter epoch and race of clearer vision to which the great evolutionist alludes in his closing paragraph, we may well be heartened by the hopefulness of one whose long life stretches from an age when the past history of man was shrouded in darkness to an age when its future seems charted in light. Surely in days to come there will be international anniversaries not only of anthropology, but of the anthropologist who has devoted himself during the whole of his life to the service of man.—HERMAN SCHEFFAUER.

COUNTLESS jubilees and anniversaries of one sort or another have given the year 1913 a special distinction over its predecessors. These anniversaries, marking the flight of one hundred, or fifty, or twenty-five years since the birth of this or that significant idea or event, have all given occasion for some form of festival commemoration. In the midst

of these modest, or brilliant, and frequently clamorous festivals, the impulses of which extend through the entire structure of society, we ought not to overlook a golden jubilee which unpretentious science is quietly celebrating within her own restricted boundaries. This anniversary has to do with the science of man in its wider significance, with our knowledge of man in the making—in one word, with anthropology.

It was in 1863 that several epoch-making works were published almost simultaneously. In these the theory of descent promulgated by Charles Darwin, some five years before, was for the first time applied to mankind in general, thus giving a scientific basis to the most important deductions from that theory. The far-sighted Thomas Henry Huxley, in his book *Man's Place in Nature*, threw a world of light upon the close relationship existing between man and the lower animals. He succeeded in establishing his famous "Pithecometra Principle" as one of the indisputable facts of scientific discovery. This important Huxelian law declares that: "The differences in construction of any part of the body are less between man and the anthropoid apes than between the latter and the lower apes."

In the same year the gifted German zoologist Karl Vogt, in his *Lectures upon Man, his Place in the Universe and in the History of Earth*, proved that the historical evolution of the animal world and the earlier history of man led to the identical conclusion, namely, that the latter had developed from the former; 1863 was also the year in which I gave my public lecture at the Congress of Natural Historians at Stettin. My subject on that occasion was Darwin's theory of evolution. In this lecture I sought to indicate its general significance for our entire conception of the universe as well as its especial importance for the understanding of the human creature and his natural evolution. If man, instead of being "created" in a supernatural manner, has been developed through gradual differentiation from a series of the higher vertebrates, then, beyond all doubt, must anthropology be considered as a part of zoology. Later, in 1874, when I published my *Anthropogeny*, I established this principle which I had already postulated in the *General Morphology* in 1866. By means of the unmistakable evidence of the Biogenetic Law (which may be described by the phrase: The human embryo repeats in its growth the his-

tory of the human race), I revealed how harmonious a relationship exists between the facts in the history of human embryology, comparative anatomy, and palæontology, and how clear a conception of the fundamental traits of our racial history may be derived from them.

During the half-century which has since then elapsed, our views concerning this great problem of humanity—thanks to the enormous progress made in the foregoing branches of science—have been substantiated in the most satisfying manner. The general theory of descent as one of the foundation stones of our monistic principles of evolution, has been established most convincingly by innumerable advances, great and small, into the discussion of which it would be useless to enter in this brief anniversary article. But by means of extensive and thorough researches into the comparative natural history of the mammalia and of man, we have attained to so clear an understanding of all that relates to phylogeny, or the science of species, that we may now glance over the most important stages of our long racial history in all its ramifications. In the lecture which I delivered at Cambridge in 1898 on “Our Present Knowledge of the Origin of Man,” and again, somewhat more thoroughly, in my commemoration essay entitled “Our Ancestral Line of Descent,” I distinguished six great periods and thirty shorter stages in the prolonged gradations of the evolutionary forms. These lead us through more than a hundred million years from the primal cell up to man. So far as detailed facts are concerned I must refer the reader to the works mentioned above, especially to the later editions of the *Anthropogeny* and *The Natural History of Creation*. I shall therefore content myself with calling special attention to the peculiar accuracy of the knowledge we have been able to win and to its great significance for the advancement of our civilization.

So far as the accuracy of our phyletic hypotheses is concerned, there is a distinct difference between the two chief divisions of our racial or “stem” history, according as to whether they are directly supported by the tangible fossil records of the science of palæontology or not. In the earlier main division, that is to say from the Silurian age to the present day, there are found innumerable fossil remains of petrified vertebrates—fishes, amphibia, reptilia, and mammalia. Comparative anatomy having proved to us the unity

of the entire stem of vertebrates, it will be necessary here only to select those extinct form-groups which belong to the ancestral line of man and to arrange them in a phyletic order. This historical sequence of the group of vertebrates gives us so manifest and indisputable a series of empirical records that we may without hesitation proclaim them as natural historical facts.

In the upper Silurian strata we find, first of all, petrified fishes; in the Devonian, ganoid or plated fishes; in the Carboniferous, salamander-like amphibia; in the Permian lizard-like reptiles; in the Triassic the earlier mammalia; in the Tertiary and Cretaceous the later mammalia; and in the Pliocene the more highly developed Primates. All of these are distinct forms of which a great portion may certainly be classed as belonging to the ancestral line of man. In view of the well-known incompleteness of the fossil records of creation, it is, however, impossible to recognize certain forms of these classes as forming an indisputable part of the ancestry of man.

The most striking truth which these comprehensive investigations into the family-tree history of the vertebrates have disclosed to us, is *the unity of the entire stem of vertebrates*, and still further, the unity of that class of mammals which constitutes its latest and most highly developed branch. One cannot too often emphasize the fact that the organism of man corresponds in all its characteristic peculiarities of construction and of function with that of all other vertebrates, especially with that of all other mammals. The human race accordingly appears in the light of modern phylogeny as one of the most recent and most highly developed of this particular species. In comparison with this fundamental truth the much-disputed theory of the descent of man from the ape is, after all, only of secondary importance. The fact that man stands closer to the apes and anthropoid apes in all that relates to his own peculiar organization has been acknowledged ever since Linnæus combined these higher animals in the order of Primates or Anthropomorpha in his epoch-making system of natural history published in 1735.

Modern zoologists and anthropologists who recognize this truth draw from it the natural conclusion that man has been evolved from the Primates, or, more exactly, from a line of extinct higher animals, from apes—formerly lower apes or

ape-like creatures. The layman, however, who is but scantily acquainted with these zoological facts and therefore disposed to reject their logical conclusions, is but little influenced. For the prevailing idea of the common descent of all mammals—from one “primary mammal” and of all vertebrates from one “primary vertebrate,” continues to persist in spite of everything.

In the first and older geological period, that of the pre-Silurian age, we encounter less definite evidence and are therefore enabled to move with far less certainty than in the second or more recent period. Here we find none of those fossil remains which in the shape of petrified parts of skeletons and scales and bones of the vertebrates furnish us with such invaluable nuclei for reconstruction. The lowest forms of vertebrates which antedated the fishes, such as the soft-skinned *Cyclostoma* or round-mouthed fishes, and the headless variety known as *Acrania*, were devoid of all solid bone structure and could not possibly have been preserved, even in a petrified condition. The same thing applies to all the spineless ancestors of the vertebrates. We are therefore forced to rely upon the original testimony offered by comparative anatomy and Ontogeny (the science which deals with the development of the individual) for our knowledge of the descent of these species. The experienced natural historian acquainted with these morphological and embryological facts will, of course, find in them a rich storehouse of the most significant and interesting knowledge. All authorities are now agreed as to the validity of the hypothesis which assumes that the ancestral vertebrates were preceded by a long line of pre-Silurian invertebrates, and that the earliest ancestral forms are to be sought for in the unicellular organisms, or Protozoa. There is, however, a great divergence of opinion among scientists on the question from which branch of the invertebrates the earliest forms of genuine vertebrates are descended. Earlier branches of this long and hypothetical line of ancestral forerunners will very likely be found among the order of worms, the *Vermalia*, or, in a wider sense, worm-like creatures.

The study of comparative embryology has thrown a most valuable light upon these obscure questions of our more distant racial history. It is this science which teaches us that the most primitive embryo forms which develop themselves from the fertilized eggs are essentially similar in all the

Metazoa, a term that comprises all multicellular and tissue-building animals. In the *Theory of the Gastræa*, published in 1872-1874, I was enabled to furnish most difficult proof to the effect that the same embryo form develops everywhere, even where apparently dissimilar, in the shape of a tiny bubble, the spherical "blastula." Its thin wall is the "blastoderm" and forms itself into two simple cell-layers. The simple hollow body-cavity is the primitive gut, its opening the primitive mouth. All the other organs of the Metazoa are evolved by manifold modifications from this common form of the "gastrula." Supported in my deductions by the Biogenetic Law, I came to the conclusion that this embryo-form was the true repetition or recapitulation of a corresponding long-extinct "stem-form," conditioned by heredity—that is to say, of a hypothetical gastræad, greatly modified as it may have been by adaptation. The manner in which the development of this universal "stem-form" of all Metazoa may be traced from a line of Protozoa or unicellular animals is made clear in the investigations which I have embodied in my *Theory of the Gastræa*.

Every clear and fearless thinker, especially the natural historian, who is able to survey as a whole the astonishing progress made in scientific anthropology during the last fifty years must concede to it achievements of the highest value to the whole realm of natural science. Even if the immediate result, attained by the experience of the senses, by observation, comparison, and experiment, should bring us only a deeper understanding of our physical organization and development, we are also, none the less, enlightened upon the spiritual side of our being—since both sides are indissolubly connected. The "soul" of man, like that of all other animals that possess a spine, is no mystical figment of fancy. It is no particular unnatural entity which inhabits a body temporarily and then quits it at death. On the contrary, we have now ascertained in the clearest, most indisputable manner that all which we term the "soul" is in a scientific sense nothing more than the total effect or function of the "soul-cells," of the neurons in the brain. It has absolutely nothing to do with the discovery of truth, which is and must always remain the goal of all uncorrupted science. It was the inspiration of such a motive which impelled me to write the *Riddle of the Universe*, and the belief that truth will prevail may, perhaps, find

some support in the almost universal acceptance of that work.

The marvelous advances made by monistic anthropology must sooner or later exert a tremendous influence upon philosophy, that queen of all the sciences. It is philosophy which is to unite the general conclusions of anthropology with a clear and harmonious conception of the universe. The influences which tend toward this great consummation are, however, proceeding in a very slow and gradual manner at present. We must not forget that the prevailing dualistic philosophy of the schools, or "paper philosophy,"—to use the telling phrase of Professor William Ostwald—is still confined in the swaddling-bands of medieval traditions and of orthodox theology. It affects to ignore the most important achievements of our monistic philosophy of nature. It is especially hostile to the hated "monkey theory," and to the entire idea of man's descent from the vertebrates. But all such opposition is futile, for these things are no longer empty hypotheses, but well-proved and incontrovertible facts of natural history. *

The realm of religion since earliest times has been intimately bound up with that of philosophy. The theoretical duty of both religion and philosophy was to establish a reasonable conception of the Universe, what the Germans call a "*Weltanschauung*"—their practical duty was to reconcile this with a corresponding system of morals suitable for the conduct of life. Twenty years have now flown since in a lecture at Altenburg I described Monism as "a bond between Religion and Science." Later, in the *Riddle of the Universe*, I emphasized the fact that our monistic philosophy (in the sense in which it was conceived by Spinoza and Goethe) did not lead to a destruction of religion, but only to a reasonable reform of it. The "God-Nature" of Goethe or the "Nature-God" of Spinoza, the so-called *Deus sive Natura*, is indissolubly related to the basic idea upon which we have founded our doctrine of evolution. The wider acceptance of this monistic Pantheism has already begun to bear fruit in all the contingencies and practical affairs of life, sociology, ethics, pedagogics, and so on. It is certain that sooner or later it will lead mankind to a higher, happier, and more consummate condition of life.

This glance backward at the splendid triumphs which monistic anthropology has achieved side by side with the

theory of evolution in the last fifty years justifies us in joyously celebrating what we might entitle "Fifty Years of Anthropology." The "question of questions"—to use a phrase coined by Huxley in 1863—the fundamental question of "Man's Place in Nature," has been happily solved in our day. The solid ground has fallen away from the feet of that superstition which sets up man as a being superior to Nature, and which, unfortunately, still holds so great a part of mankind under its ban. We may be pardoned, I trust, if we indulge ourselves in the hope that the continuous progress of science will enable that true civilization upon which the real happiness of humanity depends to attain a higher and higher degree of perfection.

ERNST HAECKEL.